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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,529	10/11/2005	Jae Hyun Lee	LEE0036US	6682
23413 7590 10/21/2009 CANTOR COLBURN, LLP 20 Church Street 22nd Floor Hartford, CT 06103				
EXAMINER ARCERO, ADAM A				
ART UNIT		PAPER NUMBER		
1795				
NOTIFICATION DATE		DELIVERY MODE		
10/21/2009		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

### Office Action Summary

**Application No.**

10/552,529

**Applicant(s)**

LEE ET AL.

**Examiner**

ADAM A. ARCIERO

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date 08/13/2009
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**CATHODE ACTIVE MATERIAL COMPRISING ADDITIVE FOR IMPROVING  
OVERDISCHARGE-PERFORMANCE AND LITHIUM SECONDARY BATTERY  
USING THE SAME**

Examiner: Adam Arciero      S.N. 10/552,529      Art Unit: 1795      October 15, 2009

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 13, 2009 has been entered. Claims 1-6 and 8-10 were amended.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 112***

3. The claims rejections under 35 U.S.C. 112, first paragraph on claims 1-10 are withdrawn, because the claims have been amended.

***Claim Rejections - 35 USC § 103***

4. The claims rejections under 35 U.S.C. 103(a) as being unpatentable over MANABU et al. and HASEGAWA et al. on claims 1-10 are maintained.

As to Claims 1, 3-5 and 9, MANABU et al. discloses a lithium secondary battery comprising a positive active material layer wherein said active material layer comprises a lithium-transition metal oxide of  $\text{Li}_x\text{CoO}_2$  wherein  $0.9 \leq x \leq 1.1$ , capable of lithium ion intercalation/deintercalation. Said active material also comprises a lithium manganese oxide represented by  $\text{Li}_x\text{Ni}_y\text{Mn}_{1-y-z}\text{M}_z\text{O}_2$  with  $0.9 \leq x \leq 1.2$ ;  $0.4 \leq y \leq 0.6$  and  $0 \leq z \leq 0.2$ ; which is in the form of a R-3-m rhombohedron structure (layered structure) and wherein M can be Cr (paragraph [0009]) and “z” can be zero. MANABU et al. discloses a lithium secondary battery having an anode ([0026]), a cathode ([0008]), a separator ([0023]), a nonaqueous electrolyte comprising an electrolyte compound ([0022]) and a salt ([0023]). MANABU et al. does not expressly disclose wherein the lithium manganese oxide is represented by  $\text{LiM}_x\text{Mn}_{1-x}\text{O}_2$  where  $0.05 \leq x \leq 0.5$  and M is at least Cr, Al, Mn and Co and wherein said lithium manganese oxide has a higher irreversible capacity than the lithium-transition metal oxide.

However, HASEGAWA et al. teaches of a positive active material having a layered structure represented by  $\text{Li}_x\text{A}_{1-y}\text{M}_y\text{O}_2$  where A can be Mn, Co and/or Ni and M can be Cr, Ni Mn, etc., and  $0.05 \leq x \leq 1.1$  and  $0 \leq y \leq 0.5$  (Abstract and col. 1, lines 24-25), more specifically  $\text{LiCr}_{0.1}\text{Mn}_{0.9}\text{O}_2$  (Claim 3). HASEGAWA et al. teaches that the elements Ni, Co, Mn and Cr are interchangeable within this formula for positive active materials in non-aqueous lithium batteries. Therefore, the structure,  $\text{Li}_x\text{Ni}_y\text{Mn}_{1-y-z}\text{M}_z\text{O}_2$ , disclosed by MANABU et al. and the claimed structure of  $\text{LiM}_x\text{Mn}_{1-x}\text{O}_2$  where  $0.05 \leq x \leq 0.5$  and M is at least Cr, Al, Mn and Co fall within the formula disclosed by HASEGAWA et al. These ranges encompass the claimed values for Li, Cr and Mn (Abstract). The courts have held that in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists.

*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Furthermore, HASEGAWA et al. is clearly teaching that  $\text{LiCr}_{0.1}\text{Mn}_{0.9}\text{O}_2$  and the active material formula disclosed by MANABU et al. used as positive active materials are considered functionally equivalent. Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to substitute the  $\text{LiCr}_{0.1}\text{Mn}_{0.9}\text{O}_2$  active material of HASEGAWA et al. for the second lithium manganese oxide active material of MANABU et al., because HASEGAWA et al. teaches that they are recognized equivalents.

MANABU et al. and HASEGAWA et al. teach a cathode active material having a mixture of a lithium-transition metal oxide with a lithium manganese oxide. However, the prior art references do not specifically disclose wherein the second lithium transition metal oxide undergoes a structural change on the first charge from a layered material to a material having a spinel structure, and the second lithium transition metal oxide has an irreversible capacity of 0.5 mole of lithium per two oxygen atoms on the first charge. However, it is the position of the Examiner that such properties are inherent, given that the active materials of MANABU et al. and HASEGAWA et al. and the present application are the same. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

As to Claim 2, MANABU et al. teaches a lithium manganese oxide having a layered structure as discussed above, wherein said structure has a content of 20-70% by weight (paragraph [0013]). This range overlaps the claimed range. The courts have held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie*

case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

As to Claim 6, MANABU et al. teaches the formula 1 starting material, however MANABU et al. does not expressly disclose wherein the lithium manganese oxide having a layered structure changes to a spinel structure represented by formula 2, after the first charge/discharge. However, it is the position of the Examiner that such properties are inherent, given that the positive active materials of MANABU et al. and HASEGAWA et al. and the present application are the same. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*, *In re Robertson*, 49 USPQ2d 1949 (1999).

As to Claim 7, MANABU et al. teaches a nonaqueous electrolyte employing a lithium salt such as  $\text{LiPF}_6$  ([0023]).

As to Claim 8, MANABU et al. teaches a lithium manganese oxide having a layered structure as discussed above, wherein said structure has a content of 20-70% by weight (paragraph [0013]). This range overlaps the claimed range. The courts have held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

As to Claim 10, MANABU et al. teaches the lithium transition metal oxide as being  $\text{Li}_x\text{CoO}_2$  where  $0.9 \leq x \leq 1.1$  ([0009]) which encompasses the claimed value of 1. The courts have held that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior

art” a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

### ***Response to Arguments***

1. Applicant's arguments filed on August 13, 2009 have been fully considered but they are not persuasive.

*Applicant's principal arguments are:*

a) *MANABU et al. and HASEGAWA et al. do not teach or disclose adding a second lithium transition metal oxide that undergoes a structural change on the first charge from a layered material to a material having a spinel structure or a material with an irreversible capacity of 0.5 mole of lithium per two moles of oxygen (claims 1 and 5).*

b) *Manabu et al. teaches an active material that must contain nickel and therefore it would not be obvious to remove nickel from the active material (claims 1 and 5).*

In response to Applicant's arguments, please consider the following comments.

a) MANABU et al. teaches of having two lithium transition metal oxides. HASEGAWA et al. teaches of the claimed lithium manganese oxide having a layered structure of the present invention, which is functionally equivalent to the second lithium transition metal oxide of MANABU et al. and one of ordinary skill in the art would find it obvious to substitute one known element for another. Furthermore, it is the position of the Examiner that such properties are inherent, given that the active materials of MANABU et al. and HASEGAWA et al. and the present application are the same. A reference which is silent about a claimed invention's

features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

b) The Examiner applies the teachings of HASEGAWA et al. to substitute one functionally equivalent active material for that of MANABU et al. Nickel is not being removed from the active material of MANABU et al., but the active material of MANABU et al. is being substituted by that of HASEGAWA et al.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795